

## I CLAIM:

1. A composition for treating plants in a body of soil, comprising:

substantially any combination of water solution stable macronutrients and/or micronutrients of substantially any concentration and/or concentrations.

2. The composition of claim 1, further comprising:

a plant promoting effective amount of solution stable  $\text{Ca}^{++}$  moieties;

a plant promoting effective amount of solution stable  $\text{S}^{6+}$  moieties;

a plant promoting effective amount of solution stable  $\text{Mg}^{++}$  moieties; and,

a plant promoting effective amount of solution stable  $\text{N}^{3-}$  moieties.

3. The composition of claim 2, wherein said solution stable moieties are a reaction product formed from the reaction of:

a first reactant selected from the group consisting of Sulfamic acid, a water soluble Sulfamic acid derivative, an oil soluble Sulfamic acid derivative that can be reacted to provide a water solution stable Sulfamate, and combinations thereof; and,

a second micronutrient and/or macronutrient moiety-including reactant selected from the group consisting of a carbonate, a hydroxide, a carbonate hydroxide, a hydroxide oxide, a metal, and combinations thereof.

4. The composition of claim 2, wherein the solution stable moieties are formed by reacting effective amounts of:

at least one member selected from the group consisting of:

a powdered micronutrient metal, a powdered macronutrient metal, Dolomite, Aragonite (Calcium Carbonate), Artinite (Hydrated Magnesium Carbonate Hydroxide), Aurichalcite (Zinc Copper Carbonate Hydroxide), Azurite (Copper Carbonate Hydroxide), Barringtonite (Hydrated Magnesium Carbonate), Baylissite (Hydrated Potassium Magnesium Carbonate), Brugnatellite (Hydrated Magnesium Iron Carbonate Hydroxide), Butschliite (Potassium Calcium Carbonate), Calcite (Calcium Carbonate), Gaspeite (Nickel Magnesium Iron Carbonate), Magnesite (Magnesium Carbonate), Rhodochrosite (Manganese Carbonate), Siderite (Iron Carbonate), Smithsonite (Zinc Carbonate), Ankerite (Calcium Iron Carbonate), Huntite (Calcium Magnesium Carbonate), Kutnohorite (Calcium Manganese Magnesium Iron Carbonate), Minrecordite (Calcium Zinc Carbonate), Norsethite (Barium Magnesium Carbonate), Fairchildite (Potassium Calcium Carbonate), Georgeite (Hydrated Copper Carbonate Hydroxide), Hellyerite (Hydrated Nickel Carbonate), Hydrozincite (Zinc Carbonate Hydroxide), Ikaite (Hydrated Calcium Carbonate), Kalicinite (Potassium Bicarbonate), Lansfordite (Hydrated Magnesium Carbonate), Loseyite (Manganese Zinc Carbonate Hydroxide), Malachite (Copper Carbonate Hydroxide), Monohydrocalcite (Hydrated Calcium Carbonate), Nesquehonite (Hydrated Magnesium Bicarbonate Hydroxide), Pokrovskite (Hydrated Magnesium Carbonate Hydroxide), Pyroaurite (Hydrated Magnesium Iron Carbonate Hydroxide), Glaukospherite (Copper Nickel Carbonate Hydroxide), Mcguinnessite (Magnesium Copper Carbonate Hydroxide), Nullaginite (Nickel Carbonate Hydroxide), Rosasite (Copper Zinc Carbonate Hydroxide), Zincrosasite (Zinc Copper Carbonate Hydroxide), Sclarite (Zinc Magnesium Manganese Carbonate

Hydroxide), Sergeevite (Hydrated Calcium Magnesium Carbonate Bicarbonate Hydroxide), Sjogrenite (Hydrated Magnesium Iron Carbonate Hydroxide), Teschemacherite (Ammonia Bicarbonate), Vaterite (Calcium Carbonate), Zaratite (Hydrated Nickel Carbonate Hydroxide), Tetra-n-butylphosphonium hydroxide, Tetra-n-butylammonium hydroxide, Tetramethylammonium hydroxide, Tetraethylammonium hydroxide, Iron (III) oxyhydroxide, Iron (III) hydroxide (gamma), Iron (III) hydroxide (alpha), Potassium hydroxide, Nickel (II) hydroxide, Hexane-1,6-bis (tributylammonium) dihydroxide, Calcium hydroxide, Tetra-n-propylammonium hydroxide, Tetra-n-butylphosphonium hydroxide, Tetra-n-butylammonium hydroxide, Cobalt (II) hydroxide, Copper (II) carbonate dihydroxide, Copper (II) carbonate (basic), Copper (II) hydroxide, Ammonium hydroxide, Magnesium carbonate hydroxide, Methylboron dihydroxide, Magnesium hydroxide, Molybdenum hydroxide oxide phosphate Calcium phosphate hydroxide, Calcium phosphate tribasic, Calcium hydroxide, Zinc subcarbonate, Zinc carbonate (basic), Zinc carbonate hydroxide, Zinc hydroxide, Potassium bicarbonate, Potassium hydrogen carbonate, Potassium carbonate, Nickel (II) carbonate, Nickel (II) carbonate hydroxide, Nickel (II) carbonate (anhydrous), Nickel (II) carbonate (basic), Manganese (II) carbonate, Magnesium carbonate (basic), Magnesium carbonate hydroxide, Ammonium bicarbonate, Ammonium hydrogen carbonate, Ammonium carbonate, Nickel (II) hydroxide, Calcium phosphate hydroxide, Calcium phosphate tribasic, limestone, Magnesite, lime, slaked lime, magnesium oxide, and/or any combination thereof; and,

at least one sulfamic compound, selected from the group consisting of a compound of the formula (II):



wherein:

$\text{R}^4$  and  $\text{R}^5$  are independently selected from the group consisting of hydrogen and a monovalent hydrocarbyl group containing from 1 to about 10 carbon atoms; and at least one of  $\text{R}^4$  or  $\text{R}^5$  is hydrogen;

a compound of the formula (III):



wherein:

$\text{R}^1$  is selected from the group consisting of alkyl, hydroxyalkyl, cycloalkyl, and aryl,

$\text{R}^2$  is selected from the group consisting of hydrogen, alkyl, hydroxyalkyl, cycloalkyl and aryl;  $\text{R}^3$ ,  $\text{R}^4$  and  $\text{R}^5$  are hydrogen; and  $n$  is an integer from 1 to 3; and,

combinations thereof.

5. The composition according to claim 1, further comprising a plant promoting effective amount of water.
6. A substantially pure  $\text{CO}_2$  product formed by the reaction process of claim 2.
7. A composition for restoring the concentration of at least one essential micronutrient or macronutrient to desirable levels in a body of soil, comprising:

substantially any combination of water solution stable macronutrients and/or micronutrients of substantially any concentration and/or concentrations.

8. The composition of claim 7, further comprising:

a plant promoting effective amount of solution stable  $\text{Ca}^{++}$  moieties;

a plant promoting effective amount of solution stable  $\text{S}^{6+}$  moieties;

a plant promoting effective amount of solution stable  $\text{Mg}^{++}$  moieties; and,

a plant promoting effective amount of solution stable  $\text{N}^{3-}$  moieties.

9. The composition of claim 8, wherein said solution stable moieties are a reaction product formed from the reaction of:

a first reactant selected from the group consisting of Sulfamic acid, a water soluble Sulfamic acid derivative, an oil soluble Sulfamic acid derivative that can be reacted to provide a water solution stable Sulfamate, and combinations thereof; and

a second micronutrient and/or macronutrient moiety-including reactant selected from the group consisting of a carbonate, a hydroxide, a carbonate hydroxide, a hydroxide oxide, a metal, and combinations thereof.

10. The composition of claim 8 further comprising:

a compensating amount of said micronutrient or macronutrient included in a solution stable compound formed by the reaction of effective amounts of:

at least one member selected from the group consisting of:

Dolomite, a powdered micronutrient metal, a powdered macronutrient metal, Aragonite (Calcium Carbonate), Artinite (Hydrated Magnesium Carbonate Hydroxide), Aurichalcite

(Zinc Copper Carbonate Hydroxide), Azurite (Copper Carbonate Hydroxide),  
 Barringtonite (Hydrated Magnesium Carbonate), Baylissite (Hydrated Potassium  
 Magnesium Carbonate), Brugnatellite (Hydrated Magnesium Iron Carbonate Hydroxide),  
 Butschliite (Potassium Calcium Carbonate), Calcite (Calcium Carbonate), Gaspeite  
 (Nickel Magnesium Iron Carbonate), Magnesite (Magnesium Carbonate), Rhodochrosite  
 (Manganese Carbonate), Siderite (Iron Carbonate), Smithsonite (Zinc Carbonate),  
 Ankerite (Calcium Iron Carbonate), Huntite (Calcium Magnesium Carbonate),  
 Kutnohorite (Calcium Manganese Magnesium Iron Carbonate), Minrecordite (Calcium  
 Zinc Carbonate), Norsethite (Barium Magnesium Carbonate), Fairchildite (Potassium  
 Calcium Carbonate), Georgeite (Hydrated Copper Carbonate Hydroxide), Hellyerite  
 (Hydrated Nickel Carbonate), Hydrozincite (Zinc Carbonate Hydroxide), Ikaite  
 (Hydrated Calcium Carbonate), Kalicinite (Potassium Bicarbonate), Lansfordite  
 (Hydrated Magnesium Carbonate), Loseyite (Manganese Zinc Carbonate Hydroxide),  
 Malachite (Copper Carbonate Hydroxide), Monohydrocalcite (Hydrated Calcium  
 Carbonate), Nesquehonite (Hydrated Magnesium Bicarbonate Hydroxide), Pokrovskite  
 (Hydrated Magnesium Carbonate Hydroxide), Pyroaurite (Hydrated Magnesium Iron  
 Carbonate Hydroxide), Glaukospherite (Copper Nickel Carbonate Hydroxide),  
 Mcguinnessite (Magnesium Copper Carbonate Hydroxide), Nullaginite (Nickel  
 Carbonate Hydroxide), Rosasite (Copper Zinc Carbonate Hydroxide), Zincrosasite (Zinc  
 Copper Carbonate Hydroxide), Sclarite (Zinc Magnesium Manganese Carbonate  
 Hydroxide), Sergeevite (Hydrated Calcium Magnesium Carbonate Bicarbonate  
 Hydroxide), Sjogrenite (Hydrated Magnesium Iron Carbonate Hydroxide),  
 Teschemacherite (Ammonia Bicarbonate), Vaterite (Calcium Carbonate), Zaratite

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at least one sulfamic compound selected from the group consisting of:

a compound of the formula (II):



wherein:

R<sup>4</sup> and R<sup>5</sup> are independently selected from the group consisting of hydrogen and a monovalent hydrocarbyl group containing from 1 to about 10 carbon atoms; and at least one of R<sup>4</sup> or R<sup>5</sup> is hydrogen;

a compound of the formula (III):



wherein:

R<sup>1</sup> is selected from the group consisting of alkyl, hydroxyalkyl, cycloalkyl, and aryl,

R<sup>2</sup> is selected from the group consisting of hydrogen, alkyl, hydroxyalkyl, cycloalkyl and aryl; R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are hydrogen; and, n is an integer from 1 to 3; and,

combinations thereof.

11. The composition according to claim 7, wherein said reaction product is water-soluble.

12. The composition according to claim 7, further comprising a plant promoting effective amount of water.

13. A substantially pure CO<sub>2</sub> product formed by the reaction process of claim 7.

14. A composition for treating living cells, comprising:

substantially any combination of water solution stable macronutrients and/or micronutrients of substantially any concentration and/or concentrations.



15. The composition of claim 14, further comprising:

a cell promoting effective amount of solution stable  $\text{Ca}^{++}$  moieties;

a cell promoting effective amount of solution stable  $\text{S}^{6+}$  moieties;

a cell promoting effective amount of solution stable  $\text{Mg}^{++}$  moieties; and,

a cell promoting effective amount of solution stable  $\text{N}^{3-}$  moieties.

16. The composition of claim 14, wherein said solution stable moieties are a reaction product formed from the reaction of:

a first reactant selected from the group consisting of Sulfamic acid, a water soluble Sulfamic acid derivative, an oil soluble Sulfamic acid derivative that can be reacted to provide a water solution stable Sulfamate, and combinations thereof; and,

a second micronutrient and/or macronutrient moiety-including reactant selected from the group consisting of a carbonate, a hydroxide, a carbonate hydroxide, a hydroxide oxide, a metal, and combinations thereof.

17. The composition of claim 15, wherein the solution stable moieties are formed by reacting effective amounts of :

at least one member selected from the group consisting of:

Dolomite, a powdered micronutrient metal, a powdered macronutrient metal, Aragonite (Calcium Carbonate), Artinite (Hydrated Magnesium Carbonate Hydroxide), Aurichalcite (Zinc Copper Carbonate Hydroxide), Azurite (Copper Carbonate Hydroxide),

Barringtonite (Hydrated Magnesium Carbonate), Baylissite (Hydrated Potassium Magnesium Carbonate), Brugnatellite (Hydrated Magnesium Iron Carbonate Hydroxide), Butschliite (Potassium Calcium Carbonate), Calcite (Calcium Carbonate), Gaspeite (Nickel Magnesium Iron Carbonate), Magnesite (Magnesium Carbonate), Rhodochrosite (Manganese Carbonate), Siderite (Iron Carbonate), Smithsonite (Zinc Carbonate), Ankerite (Calcium Iron Carbonate), Huntite (Calcium Magnesium Carbonate), Kutnohorite (Calcium Manganese Magnesium Iron Carbonate), Minrecordite (Calcium Zinc Carbonate), Norsethite (Barium Magnesium Carbonate), Fairchildite (Potassium Calcium Carbonate), Georgeite (Hydrated Copper Carbonate Hydroxide), Hellyerite (Hydrated Nickel Carbonate), Hydrozincite (Zinc Carbonate Hydroxide), Ikaite (Hydrated Calcium Carbonate), Kalicinite (Potassium Bicarbonate), Lansfordite (Hydrated Magnesium Carbonate), Loseyite (Manganese Zinc Carbonate Hydroxide), Malachite (Copper Carbonate Hydroxide), Monohydrocalcite (Hydrated Calcium Carbonate), Nesquehonite (Hydrated Magnesium Bicarbonate Hydroxide), Pokrovskite (Hydrated Magnesium Carbonate Hydroxide), Pyroaurite (Hydrated Magnesium Iron Carbonate Hydroxide), Glaukospherite (Copper Nickel Carbonate Hydroxide), Mcguinnessite (Magnesium Copper Carbonate Hydroxide), Nullaginite (Nickel Carbonate Hydroxide), Rosasite (Copper Zinc Carbonate Hydroxide), Zincrosasite (Zinc Copper Carbonate Hydroxide), Sclarite (Zinc Magnesium Manganese Carbonate Hydroxide), Sergeevite (Hydrated Calcium Magnesium Carbonate Bicarbonate Hydroxide), Sjogrenite (Hydrated Magnesium Iron Carbonate Hydroxide), Teschemacherite (Ammonia Bicarbonate), Vaterite (Calcium Carbonate), Zaratite (Hydrated Nickel Carbonate Hydroxide), Tetra-n-butylphosphonium hydroxide, Tetra-n-

butylammonium hydroxide, Tetramethylammonium hydroxide, Tetraethylammonium hydroxide, Iron (III) oxyhydroxide, Iron (III) hydroxide (gamma), Iron (III) hydroxide (alpha), Potassium hydroxide, Nickel (II) hydroxide, Hexane-1,6-bis(tributylammonium) dihydroxide, Calcium hydroxide, Tetra-n-propylammonium hydroxide, Tetra-n-butylphosphonium hydroxide, Tetra-n-butylammonium hydroxide, Cobalt (II) hydroxide, Copper (II) carbonate dihydroxide, Copper (II) carbonate (basic), Copper (II) hydroxide, Ammonium hydroxide, Magnesium carbonate hydroxide, Methylboron dihydroxide, Magnesium hydroxide, Molybdenum hydroxide oxide phosphate Calcium phosphate hydroxide, Calcium phosphate tribasic, Calcium hydroxide, Zinc subcarbonate, Zinc carbonate (basic), Zinc carbonate hydroxide, Zinc hydroxide, Potassium bicarbonate, Potassium hydrogen carbonate, Potassium carbonate, Nickel (II) carbonate, Nickel (II) carbonate hydroxide, Nickel (II) carbonate (anhydrous), Nickel (II) carbonate (basic), Manganese (II) carbonate, Magnesium carbonate (basic), Magnesium carbonate hydroxide, Ammonium bicarbonate, Ammonium hydrogen carbonate, Ammonium carbonate, Nickel (II) hydroxide, Calcium phosphate hydroxide, Calcium phosphate tribasic, limestone, Magnesite, lime, slaked lime, magnesium oxide, and/or any combination thereof; and,

at least one sulfamic compound, selected from the group consisting of:

a compound of the formula (II):



wherein:

R<sup>4</sup> and R<sup>5</sup> are independently selected from the group consisting of hydrogen and a monovalent hydrocarbyl group containing from 1 to about 10 carbon atoms; and at least one of R<sup>4</sup> or R<sup>5</sup> is hydrogen;

a compound of the formula (III):



wherein:

R<sup>1</sup> is selected from the group consisting of alkyl, hydroxyalkyl, cycloalkyl, and aryl,

R<sup>2</sup> is selected from the group consisting of hydrogen, alkyl, hydroxyalkyl, cycloalkyl and aryl; R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are hydrogen; and n is an integer from 1 to 3; and,

combinations thereof.

18. The composition according to claim 14, further comprising a cell promoting effective amount of water.

19. The composition according to claim 14, wherein said composition is encapsulated.

20. The composition according to claim 14, wherein said cells are selected from the group consisting of living cells, animal cells, plant cells and combinations thereof.